Executive Summary

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Overview

The Tennessee Valley Authority's (TVA) Integrated Resource Plan (IRP), entitled TVA's Environmental and Energy Future, is intended to address the demand for power in the Tennessee Valley, the options available for meeting that demand, and the potential environmental, economic and operating impacts of each of these options. It will serve as a roadmap for meeting the energy needs of TVA's customers over the next 20 years and, as such, is being conducted in a structured framework and with the benefit of a significant amount of supporting analysis and stakeholder input.

The IRP will guide TVA in fulfilling the renewed vision adopted by the TVA Board in August 2010—to become one of the nation's leading providers of low cost and cleaner energy by 2020. TVA intends to lead the nation in improving air quality, and in increased nuclear production, and lead the Southeast in increased energy efficiency.

That vision will be accomplished while TVA continues to fulfill the mission Congress established for TVA in the TVA Act. The IRP also will be consistent with TVA's 2008 Environmental Policy as well as its 2007 Strategic Plan.

Unlike integrated resource plans prepared by investor-owned utilities, TVA's IRP goes beyond the question of the least cost portfolio of resources needed to meet long term demand, not only in its extensive public involvement but also in the preparation of an environmental impact statement under NEPA. While TVA's mission and strategy both mandate that TVA provide reliable, low cost power to its customers, it also requires TVA

to balance this mandate with several other important objectives, including reducing its environmental impacts and emissions, encouraging economic development within the Valley, promoting technological innovation, and managing the integrated river system on behalf of all of its stakeholders.

The IRP establishes a strategic direction for TVA and provides it with the flexibility to make the right choices in a dynamic, ever-changing regulatory and economic environment. Indeed, the planning environment that confronts TVA at this time remains one of the most challenging in TVA's history. In order to navigate through these challenges in a way that best supports its multiple missions, TVA must ensure that its strategy is robust under any number of possible future scenarios while remaining consistent with a philosophy of making the best possible decisions with all available information. To do so, it is imperative that TVA maintains the ability to respond effectively to planning uncertainties so that shifts in strategy can be implemented in an orderly, anticipatory way, with a clear understanding of how those shifts are likely to impact its stakeholders. When changes in future energy options become necessary, TVA will remain focused on making those choices in a way that ensures they are sound from the perspective of economics, risk, reliability and environmental stewardship.

TVA and its stakeholders have common goals of affordable, clean and reliable electricity. It is TVA's commitment that a long-term resource plan be designed that recognizes the sometimes competing needs of its stakeholders, while also respecting the constraints and trade-offs that can be required to meet these needs. This endeavor is particularly challenging now, given the difficult economic conditions facing the nation, the volatility of fuel prices and construction costs, and the regulatory uncertainty facing the electric utility industry. TVA is confident that this IRP will provide the dialogue, processes, tools and analyses needed to face these challenges in a way that ultimately ensures the successful implementation and execution of its strategic goals in support of its extremely important mission.

Public Participation

Public participation is a significant component of the IRP process. TVA is employing a variety of methods to obtain public input and began the IRP effort by providing the public with a 60-day period in which to comment on the range of topics that a sound IRP would address. During this scoping period, TVA hosted seven public meetings at various locations across the Tennessee Valley region. During these meetings, TVA made available to the public groups of experts on generating technologies (including renewable

technologies), energy efficiency, the environment, and other key aspects of its operations. It also explained the ultimate goals of the IRP, and described how the public could become involved and make their comments heard. Approximately 200 people attended these public meetings, with approximately 40 of those attendees providing their comments at those meetings. TVA also received numerous other comments by email as well as through its website that had been created expressly for the IRP effort. TVA also received comments from four federal agencies and 20 state agencies.

To ensure continued public involvement while the IRP analyses were being conducted, TVA formed a Stakeholders Review Group (SRG). This group consists of 16 individuals representing a wide range of interests. Members of the group have been asked to provide TVA their viewpoints with respect to the IRP process, assumptions, analyses and results. TVA has met regularly with the SRG to discuss key results as they are produced and intends to continue to do so until the IRP is finalized. TVA has also held quarterly briefings with the public and the media regarding IRP activities and work. In addition, TVA has released the IRP and associated Environmental Impact Statement in draft form to provide another opportunity for public input and it intends to hold additional public meetings with the express purpose of discussing the draft documents.

Chapter 2 describes the IRP public participation effort in more detail.

Need for Power

As a part of the IRP analysis, TVA must develop a forecast of the need for additional power, usually referred to in the electric utility industry as "demand." In order to develop this forecast, four basic steps are carried out:

1. **Forecast Demand** – Forecast the demand for electricity (peak demand and energy sales) for the planning horizon over the next 20 years.

2. **Calculate Firm Requirements** – Determine additional generation capacity required by adding to the forecasted demand a planning contingency (sometimes referred to as "reserves") that allows for unforeseen events, such as demand forecast inaccuracies or unplanned unit outages and other resource limitations.

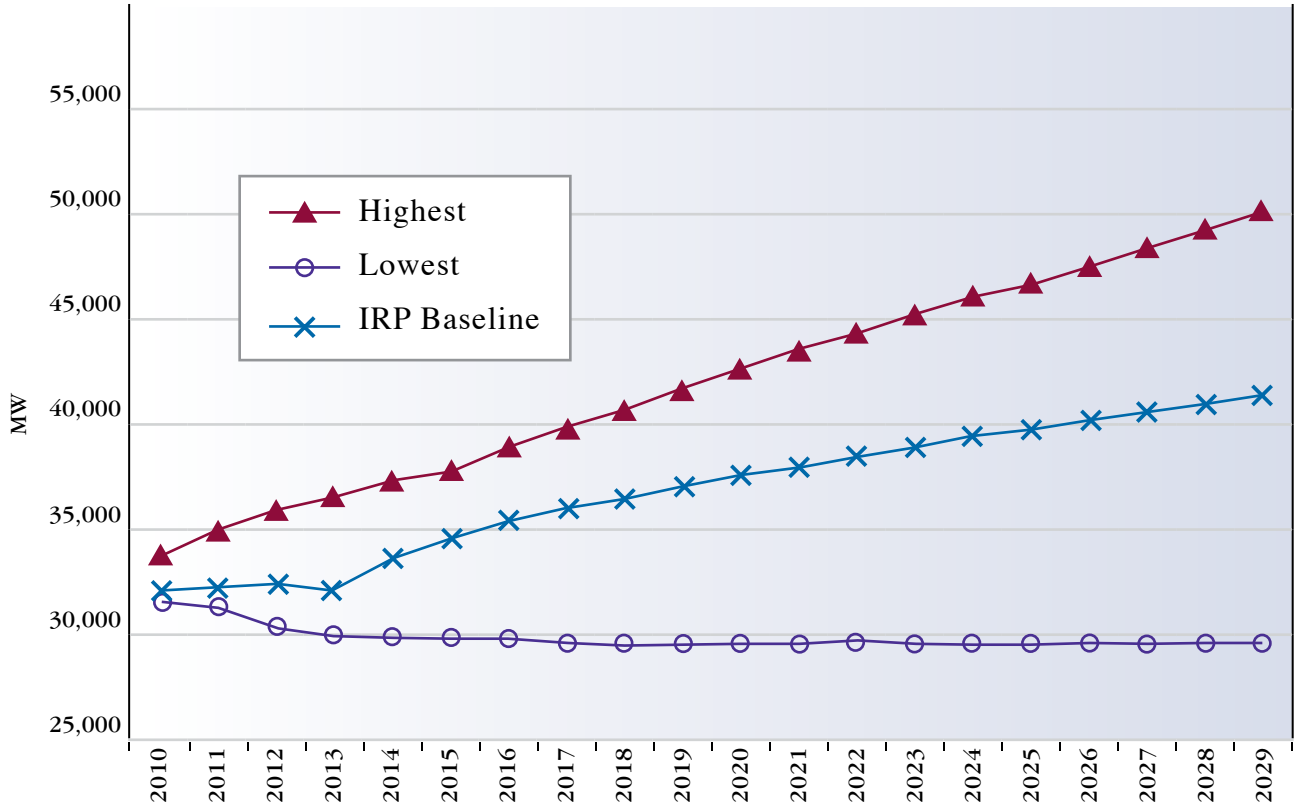
3. **Identify Existing Resources** – Identify existing generation resources available to meet the forecasted demand over the same period.

4. **Calculate Capacity Gap –** Compare the firm requirements to the amount of existing generation resources, where the difference between the two defines the need for additional resources (sometimes referred to as "capacity gap") over the planning horizon.

TVA expects future economic growth to be lower than historical averages. The effects of the recent recession have been felt across the nation and within the region, and many of these effects will continue to linger for some time, including restricted access to credit (particularly for small businesses, which have been an important source of job growth) and high levels of unemployment. Although employment growth in the manufacturing sector is declining and is expected to remain weak for the near future, opportunities for job growth in other sectors still exist, and TVA expects population growth to return as people migrate to the area to take advantage of these opportunities.

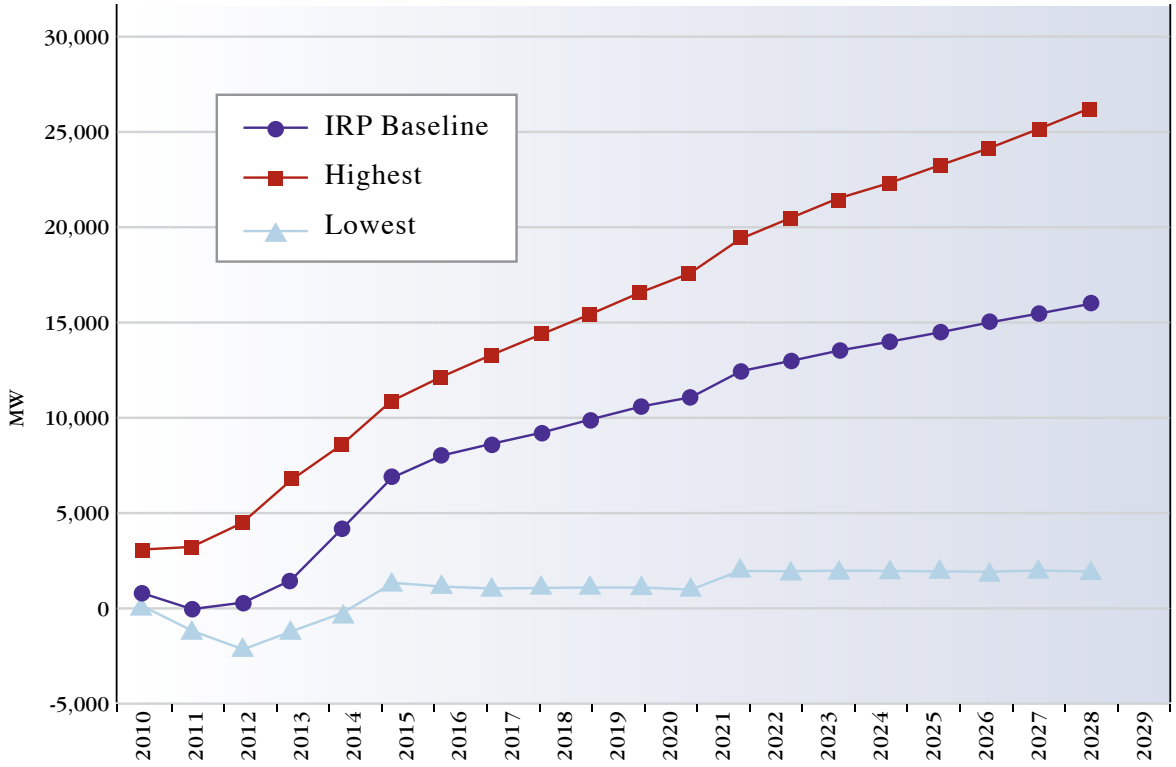
The result is that economic recovery, coupled with population growth and other factors, is expected to lead to continued growth in future power needs, although this growth is expected to occur at a lower rate than historical averages. Figure 1 shows the IRP baseline forecast of peak demand over the 20-year planning horizon. The figure also illustrates the range of load forecasts considered in the IRP with the highest and lowest representing the upper and lower bounds.

Figure 1 – Peak Load Forecast



TVA considered a broad range of forecasts for future demand for electricity in the IRP. For the vast majority of outcomes within this range, it was determined that TVA will require additional power resources to meet growing demand. These resources will include supply options and demand-side options, as well as purchases from others. Figure 2 shows the capacity gap for IRP Baseline forecast over the 20-year planning horizon. The figure also illustrates the capacity gap based on the range of peak loads considered in the IRP. The capacity gaps were developed adding a 15% planning reserve margin to the peak load forecast and subtracting existing resources. Additional detail on the need for power analysis is included in Chapter 3.

Figure 2 – Capacity Gap



Approach

A scenario planning approach is being utilized for the development of the IRP, and TVA is carrying out its analysis in a no-regrets framework. TVA's no-regrets decision making framework defines a process in which all relevant and available information is analyzed in a careful and considered fashion, with significant attention paid to what happens when the world unfolds in a way we are not expecting. In other words, strategic decisions are analyzed not only from the perspective of what we expect to occur in the future, but also from the perspective of what is possible or plausible to occur in the future. Using this framework, decisions made today and in the near future are not overly dependent on the world unfolding exactly as we expect it to today. As a result, the actions taken today are anticipated to provide benefit and value to stakeholders even if the future turns out to be different than predicted.

Scenario planning provides an understanding of how near-term and future decisions will perform under conditions that differ from those expected in the baseline forecast. By analyzing how its decisions perform under stress (higher than expected demand growth, lower than planned fuel prices, or more volatile economic conditions), TVA can

learn valuable lessons about formulating and staging those decisions, so that regardless of the world that evolves in the future, TVA's overall level of regret of any one decision is reduced. Similar near-term decisions across multiple scenarios may imply that the decisions embodied in a particular strategy are more robust and/or less "risky," while major differences may imply the possibility of future regrets and greater uncertainty.

Scenarios and planning strategies form the basic building blocks of the IRP analysis. Scenarios portray the range of possible "worlds" that TVA may encounter in the future and are based on a number of factors (uncertainties) that are outside of TVA's control. The scenarios don't attempt to predict the future, only to describe possibilities that we may need to be prepared to encounter. Scenarios are also used to test resource selection and reflect key stakeholder interests.

Examples of factors that may differ between scenarios are economic growth, inflation, fuel prices, demand growth and regulatory environments. Uncertainties vary from scenario to scenario to highlight how decisions would change under different conditions. In addition to the current "world," seven unique scenarios were developed for the IRP based on TVA's baseline forecast early in the development of the IRP as shown below:

- Scenario #1: Economy Recovers Dramatically
- Scenario #2: Environmental Focus is National Priority
- Scenario #3: Prolonged Economic Malaise
- Scenario #4: Game-Changing Technology
- Scenario #5: Energy Independence
- Scenario #6: Carbon Regulation Creates Economic Downturn
- Scenario #7: Current Approach/Baseline

Additional details on the scenarios are included in Chapter 5.

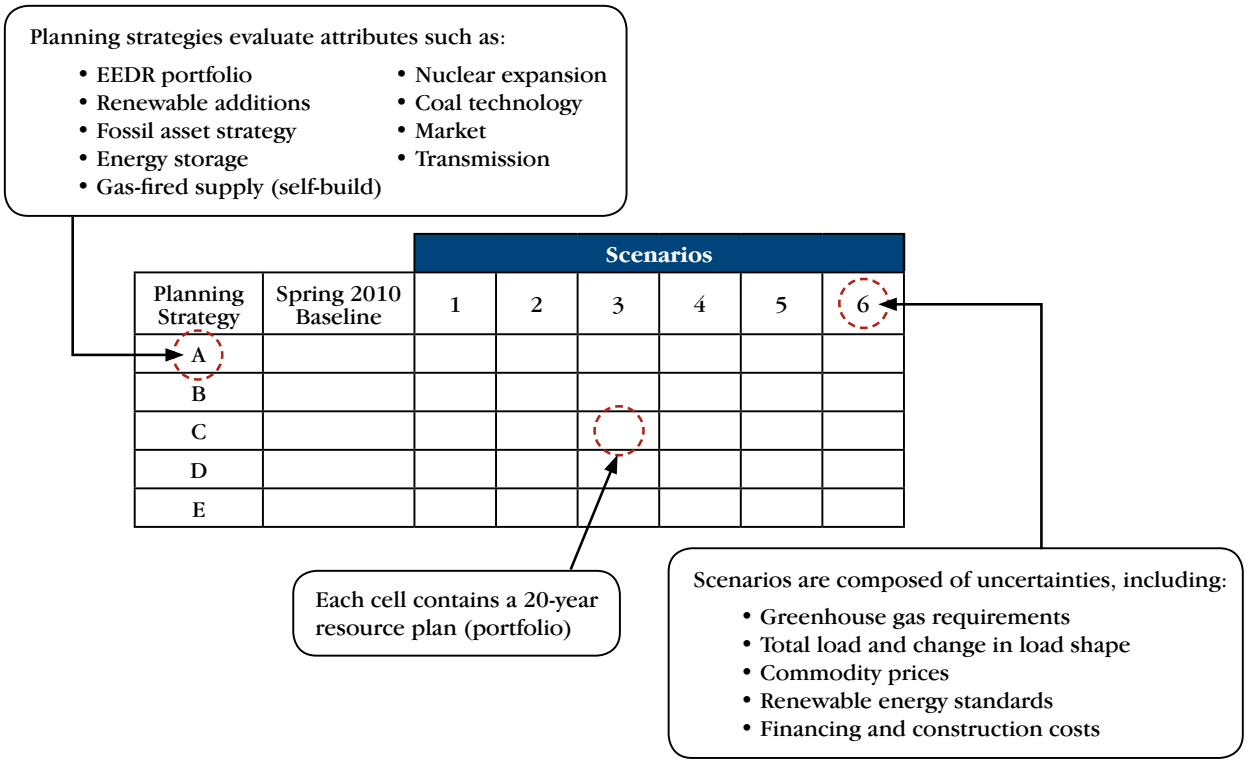
Planning strategies describe a broad range of business options that TVA could adopt and are built upon key decisions that are within TVA's control. Five specific planning strategies were designed for evaluation in the IRP:

- Strategy A: Limited Change in Current Resource Portfolio
- Strategy B: Baseline Resource Portfolio
- Strategy C: Diversity Focused Portfolio
- Strategy D: Nuclear Focused Resource Portfolio
- Strategy E: EEDR and Renewables Focused Portfolio

Additional details on planning strategies are included in Chapter 5.

Each planning strategy is evaluated across the scenarios to test which strategy performs best at meeting customer demand for electricity in that scenario. Figure 3 provides an overview of how scenarios and planning strategies are applied in scenario planning.

Figure 3 – Scenario Planning Matrix



The results produced by evaluating each of the five planning strategies across each of the seven scenarios (six scenarios and Spring 2010 Baseline) will be summarized using a scorecard designed to identify financial, risk and strategic factors that should be considered when selecting a preferred planning strategy. An overview of the scorecard process and its application in the IRP is also included in Chapter 5.

Key Themes from Results

The following key themes have emerged from the draft IRP analysis:

- Nuclear expansion is present in the majority of portfolios.
    - First nuclear unit is added between 2018 and 2022.
    - Nuclear overtakes coal as the leading energy producer.

- The idling/layup of a portion of TVA's fossil capacity are indicated in most portfolios, ranging from 2,000 MW to 7,000 MW of capacity.
- Energy Efficiency and Demand Response (EEDR) as well as renewable generation play an increasingly important role in future resource portfolios.
- Natural gas capacity additions are a viable resource option and a key source of flexibility for TVA.
- The intensity of CO_2, NO_x, SO_2, and Hg emissions decreases in all portfolios.

Preliminary results from the planning strategies have been ranked based on economic cost and risk metrics. A summary of ranking metric results is shown in Figure 4.

Figure 4 – Ranking Metrics

Rank	Planning Strategy	Preliminary Observations
1	C – Diversity Focused Resource Portfolio	- Performs the best against PVRR and risk metrics - Near the median for short-term rates
2	E – EEDR and Renewables Focused Resource Portfolio	- Near the median for short-term rates - Performs near the best for PVRR
3	B – Baseline Plan Resource Portfolio	- Ranks near the median for PVRR, short-term rates and risk
4	D – Nuclear Focused Resource Portfolio	- Ranks below the median for PVRR, rates and risk
5	A – Limited Change in Current Resource Portfolio	- Performs the worst on PVRR and risk - Ranks the best for short-term rates in some scenarios

Definitions of ranking metrics are provided in Chapter 5. Additional detail on the ranking metrics detail for each planning strategy can be found in Chapter 6.

The ranking metrics suggest:

- Diversity Focused Resource Portfolio (Planning Strategy C) and Energy Efficiency and Renewables Focused Resource Portfolio (Planning Strategy E) perform the best relative to the other planning strategies.
- Diversity Focused Resource Portfolio (Planning Strategy C) performs best in more scenarios (5 of 7) than any other strategy.
- The Baseline Plan Resource Portfolio (Planning Strategy B) performs reasonably well.
- The worst performing strategies are Limited Change in Current Resource Portfolio (Planning Strategy A) and Nuclear Focused Resource Portfolio (Planning Strategy D).

Strategic metrics represent considerations beyond cost and risk that are part of identifying the preferred planning strategy. Preliminary results have been used to assess performance against strategic measures of environmental and economic impact. Descriptions of strategic metrics are provided in Chapter 5. Additional detail on strategic metrics for each planning strategy can be found in Chapter 6.

The strategic metrics suggest:

- EEDR and Renewables Focused Resource Portfolio (Planning Strategy E) and Nuclear Focused Resource Portfolio (Planning Strategy D) have the best relative performance on strategic measures.
- Diversity Focused Resource Portfolio (Planning Strategy C) is below the top but above the average.
- The Baseline Plan Resource Portfolio (Planning Strategy B) is below the average.
- Limited Change in Current Resource Portfolio (Planning Strategy A) has the lowest relative performance on strategic metrics.

Highest Ranked Planning Strategies (Draft)

TVA will retain the top three ranked planning strategies for further evaluation. As discussed in the previous section, the top three strategies are:

1. Planning Strategy C – Diversity Focused Resource Portfolio
2. Planning Strategy E – EEDR and Renewables Focused Resource Portfolio
3. Planning Strategy B – Baseline Plan Resource Portfolio

Based on the preliminary results, Planning Strategies C, E and B are the most balanced in terms of cost, financial risk and other strategic considerations. Conversely, Planning Strategy A (Limited Change in Current Resource Portfolio) and Planning Strategy D (Nuclear Focused Portfolio) do not achieve an equivalent balance in performance compared to the ranking and strategic metrics. Therefore, Planning Strategies A and D will be removed from further consideration. Additional detail on the planning strategies retained in the draft IRP is included in Chapter 7.

By retaining three of the five planning strategies, TVA ensures that a broad range of resource options are maintained for consideration in development of the final IRP. Figure 5 summarizes the breadth of potential capacity additions based on the top three planning strategies. The capacity values shown are expressed in terms of dependable capacity at the summer peak.

Ranges represent the minimum and maximum values for each resource type and are not from a single portfolio. Previously approved projects, such as the second unit at Watts Bar Nuclear Plant, are not included in the ranges below:

Figure 5 – Range of Capacity Additions (MW)

Type	Minimum	Maximum
Nuclear	0	4,800
Combustion Turbine	0	7,500
Combined Cycle	0	5,700
IGCC	0	500
Avoided Capacity (EEDR)	1,400	6,000
Renewables	150	1,200
Pumped-Storage	0	850
Coal Reductions	0	4,700

Additional detail on the 12 portfolios used to develop the ranges shown is in Chapter 7.

Additional analysis and sensitivity testing will be completed between the draft and final IRP to identify the preferred planning strategy. In addition, public input received on the draft IRP will be incorporated into the evaluation and considered in the process. Additional detail on public participation in the development of the IRP is included in Chapter 2. A recommendation for the preferred planning strategy will be identified in the final IRP, which is scheduled for completion in the spring of 2011.